

## LOW-POWER QUAD-CHANNEL DIGITAL ISOLATOR

### Features

- High-speed operation
  - DC to 150 Mbps
- No start-up initialization required
- Wide Operating Supply Voltage: 2.70–5.5 V
- Wide Operating Supply Voltage: 2.70–5.5V
- Ultra low power (typical)
  - 5 V Operation:
    - < 1.6 mA per channel at 1 Mbps
    - < 6 mA per channel at 100 Mbps
  - 2.70 V Operation:
    - < 1.4 mA per channel at 1 Mbps
    - < 4 mA per channel at 100 Mbps
- High electromagnetic immunity
- Up to 2500 V<sub>RMS</sub> isolation
- 60-year life at rated working voltage
- Precise timing (typical)
  - <10 ns worst case
  - 1.5 ns pulse width distortion
  - 0.5 ns channel-channel skew
  - 2 ns propagation delay skew
  - 6 ns minimum pulse width
- Transient Immunity 25 kV/μs
- AEC-Q100 qualified
- Wide temperature range
  - –40 to 125 °C at 150 Mbps
- RoHS-compliant packages
  - SOIC-16 wide body
  - SOIC-16 narrow body

### Applications

- Industrial automation systems
- Hybrid electric vehicles
- Isolated switch mode supplies
- Isolated ADC, DAC
- Motor control
- Power inverters
- Communications systems

### Safety Regulatory Approvals

- UL 1577 recognized
  - Up to 2500 V<sub>RMS</sub> for 1 minute
- CSA component notice 5A approval
  - IEC 60950-1, 61010-1 (reinforced insulation)
- VDE certification conformity
  - IEC 60747-5-2 (VDE0884 Part 2)

### Description

Silicon Lab's family of ultra-low-power digital isolators are CMOS devices offering substantial data rate, propagation delay, power, size, reliability, and external BOM advantages when compared to legacy isolation technologies. The operating parameters of these products remain stable across wide temperature ranges throughout their service life. For ease of design, only VDD bypass capacitors are required.

Data rates up to 150 Mbps are supported, and all devices achieve worst-case propagation delays of less than 10 ns. All products are safety certified by UL, CSA, and VDE and support withstand voltages of up to 2.5 kVrms. These devices are available in 16-pin wide- and narrow-body SOIC packages.



# TABLE OF CONTENTS

| <b><u>Section</u></b>                                           | <b><u>Page</u></b> |
|-----------------------------------------------------------------|--------------------|
| <b>1. Electrical Specifications</b>                             | <b>3</b>           |
| <b>2. Functional Description</b>                                | <b>17</b>          |
| 2.1. Theory of Operation                                        | 17                 |
| 2.2. Eye Diagram                                                | 18                 |
| 2.3. Device Operation                                           | 19                 |
| 2.4. Layout Recommendations                                     | 21                 |
| 2.5. Typical Performance Characteristics                        | 22                 |
| <b>3. Errata and Design Migration Guidelines</b>                | <b>24</b>          |
| 3.1. Enable Pin Causes Outputs to Go Low (Revision C Only)      | 24                 |
| 3.2. Power Supply Bypass Capacitors (Revision C and Revision D) | 24                 |
| 3.3. Latch Up Immunity (Revision C Only)                        | 24                 |
| <b>4. Pin Descriptions</b>                                      | <b>25</b>          |
| <b>5. Ordering Guide</b>                                        | <b>26</b>          |
| <b>6. Package Outline: 16-Pin Wide Body SOIC</b>                | <b>28</b>          |
| <b>7. Land Pattern: 16-Pin Wide-Body SOIC</b>                   | <b>29</b>          |
| <b>8. Package Outline: 16-Pin Narrow Body SOIC</b>              | <b>30</b>          |
| <b>9. Land Pattern: 16-Pin Narrow Body SOIC</b>                 | <b>32</b>          |
| <b>10. Top Marking: 16-Pin Wide Body SOIC</b>                   | <b>33</b>          |
| 10.1. 16-Pin Wide Body SOIC Top Marking                         | 33                 |
| 10.2. Top Marking Explanation                                   | 33                 |
| <b>11. Top Marking: 16-Pin Narrow Body SOIC</b>                 | <b>34</b>          |
| 11.1. 16-Pin Narrow Body SOIC Top Marking                       | 34                 |
| 11.2. Top Marking Explanation                                   | 34                 |
| <b>Document Change List</b>                                     | <b>35</b>          |

## 1. Electrical Specifications

**Table 1. Recommended Operating Conditions**

| Parameter                      | Symbol    | Test Condition       | Min  | Typ | Max | Unit |
|--------------------------------|-----------|----------------------|------|-----|-----|------|
| Ambient Operating Temperature* | $T_A$     | 150 Mbps, 15 pF, 5 V | -40  | 25  | 125 | °C   |
| Supply Voltage                 | $V_{DD1}$ |                      | 2.70 | —   | 5.5 | V    |
|                                | $V_{DD2}$ |                      | 2.70 | —   | 5.5 | V    |

**\*Note:** The maximum ambient temperature is dependent on data frequency, output loading, number of operating channels, and supply voltage.

**Table 2. Absolute Maximum Ratings<sup>1</sup>**

| Parameter                                | Symbol             | Min  | Typ | Max            | Unit      |
|------------------------------------------|--------------------|------|-----|----------------|-----------|
| Storage Temperature <sup>2</sup>         | $T_{STG}$          | -65  | —   | 150            | °C        |
| Ambient Temperature Under Bias           | $T_A$              | -40  | —   | 125            | °C        |
| Supply Voltage (Revision C) <sup>3</sup> | $V_{DD1}, V_{DD2}$ | -0.5 | —   | 5.75           | V         |
| Supply Voltage (Revision D) <sup>3</sup> | $V_{DD1}, V_{DD2}$ | -0.5 | —   | 6.0            | V         |
| Input Voltage                            | $V_I$              | -0.5 | —   | $V_{DD} + 0.5$ | V         |
| Output Voltage                           | $V_O$              | -0.5 | —   | $V_{DD} + 0.5$ | V         |
| Output Current Drive Channel             | $I_O$              | —    | —   | 10             | mA        |
| Lead Solder Temperature (10 s)           |                    | —    | —   | 260            | °C        |
| Maximum Isolation Voltage (1 s)          |                    | —    | —   | 3600           | $V_{RMS}$ |

**Notes:**

1. Permanent device damage may occur if the above Absolute Maximum Ratings are exceeded. Functional operation should be restricted to conditions as specified in the operational sections of this data sheet. Exposure to absolute maximum ratings for extended periods may degrade performance.
2. VDE certifies storage temperature from -40 to 150 °C.
3. See "5. Ordering Guide" on page 26 for more information.

**Table 3. Electrical Characteristics**

( $V_{DD1} = 5\text{ V} \pm 10\%$ ,  $V_{DD2} = 5\text{ V} \pm 10\%$ ,  $T_A = -40$  to  $125\text{ }^{\circ}\text{C}$ ; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                            | Symbol           | Test Condition                     | Min                                       | Typ | Max | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------|-------------------------------------------|-----|-----|------|
| High Level Input Voltage                                                                                                                                                                                                                                                                                                                                                             | V <sub>IH</sub>  |                                    | 2.0                                       | —   | —   | V    |
| Low Level Input Voltage                                                                                                                                                                                                                                                                                                                                                              | V <sub>IL</sub>  |                                    | —                                         | —   | 0.8 | V    |
| High Level Output Voltage                                                                                                                                                                                                                                                                                                                                                            | V <sub>OH</sub>  | I <sub>oh</sub> = −4 mA            | V <sub>DD1</sub> , V <sub>DD2</sub> − 0.4 | 4.8 | —   | V    |
| Low Level Output Voltage                                                                                                                                                                                                                                                                                                                                                             | V <sub>OL</sub>  | I <sub>ol</sub> = 4 mA             | —                                         | 0.2 | 0.4 | V    |
| Input Leakage Current                                                                                                                                                                                                                                                                                                                                                                | I <sub>L</sub>   |                                    | —                                         | —   | ±10 | μA   |
| Output Impedance <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                        | Z <sub>O</sub>   |                                    | —                                         | 85  | —   | Ω    |
| Enable Input High Current                                                                                                                                                                                                                                                                                                                                                            | I <sub>ENH</sub> | V <sub>ENx</sub> = V <sub>IH</sub> | —                                         | 2.0 | —   | μA   |
| Enable Input Low Current                                                                                                                                                                                                                                                                                                                                                             | I <sub>ENL</sub> | V <sub>ENx</sub> = V <sub>IL</sub> | —                                         | 2.0 | —   | μA   |
| DC Supply Current (All inputs 0 V or at Supply)                                                                                                                                                                                                                                                                                                                                      |                  |                                    |                                           |     |     |      |
| Si8440Ax, Bx and Si8445Bx                                                                                                                                                                                                                                                                                                                                                            |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 1.5 | 2.3 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.5 | 3.8 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 5.7 | 8.6 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 2.6 | 3.9 |      |
| Si8441Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 1.8 | 2.7 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.5 | 3.8 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 4.9 | 7.4 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 3.6 | 5.4 |      |
| Si8442Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.3 | 3.5 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.3 | 3.5 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 4.5 | 6.8 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 4.5 | 6.8 |      |
| 1 Mbps Supply Current (All inputs = 500 kHz square wave, C <sub>I</sub> = 15 pF on all outputs)                                                                                                                                                                                                                                                                                      |                  |                                    |                                           |     |     |      |
| Si8440Ax, Bx and Si8445Bx                                                                                                                                                                                                                                                                                                                                                            |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.6 | 5.4 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.0 | 3.9 |      |
| Si8441Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.5 | 5.3 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.4 | 5.1 |      |
| Si8442Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.6 | 5.4 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.6 | 5.4 |      |
| Notes:                                                                                                                                                                                                                                                                                                                                                                               |                  |                                    |                                           |     |     |      |
| 1. The nominal output impedance of an isolator driver channel is approximately 85 Ω, ±40%, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces. |                  |                                    |                                           |     |     |      |
| 2. t <sub>PSK(P-P)</sub> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.                                                                                                                                                                                        |                  |                                    |                                           |     |     |      |
| 3. See "3. Errata and Design Migration Guidelines" on page 24 for more details.                                                                                                                                                                                                                                                                                                      |                  |                                    |                                           |     |     |      |
| 4. Start-up time is the time period from the application of power to valid data at the output.                                                                                                                                                                                                                                                                                       |                  |                                    |                                           |     |     |      |

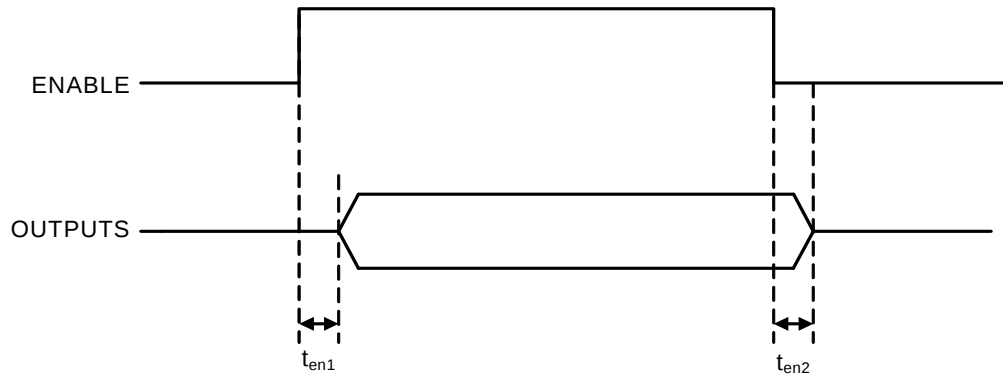
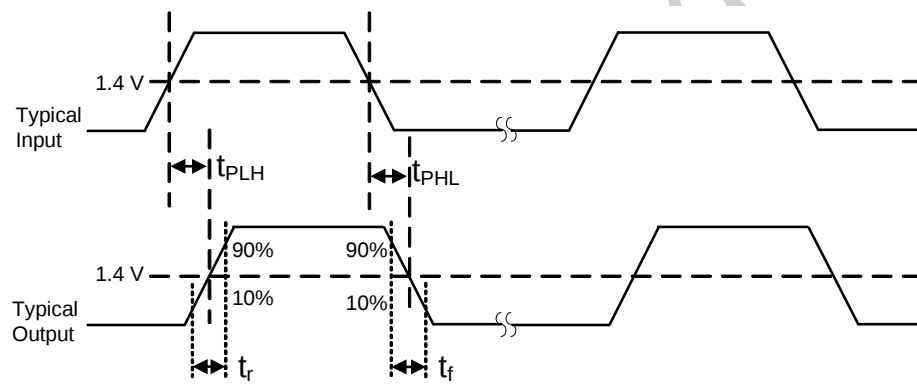
**Table 3. Electrical Characteristics (Continued)**(V<sub>DD1</sub> = 5 V ±10%, V<sub>DD2</sub> = 5 V ±10%, T<sub>A</sub> = -40 to 125 °C; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Symbol                              | Test Condition | Min | Typ  | Max  | Unit |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------|-----|------|------|------|
| <b>10 Mbps Supply Current (All inputs = 5 MHz square wave, CI = 15 pF on all outputs)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |                |     |      |      |      |
| <b>Si8440Bx, Si8445Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 3.6  | 5.4  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.0  | 5.6  |      |
| <b>Si8441Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 3.7  | 5.5  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.1  | 5.7  |      |
| <b>Si8442Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.2  | 5.9  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.2  | 5.9  |      |
| <b>100 Mbps Supply Current (All inputs = 50 MHz square wave, CI = 15 pF on all outputs)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                     |                |     |      |      |      |
| <b>Si8440Bx, Si8445Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 3.8  | 5.7  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 19.4 | 24.3 |      |
| <b>Si8441Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 8.0  | 10   | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 15.8 | 19.8 |      |
| <b>Si8442Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 11.8 | 14.8 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 11.8 | 14.8 |      |
| <b>Timing Characteristics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |                |     |      |      |      |
| <b>Si844xAx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| Maximum Data Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                     |                | 0   | —    | 1.0  | Mbps |
| Minimum Pulse Width                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                     |                | —   | —    | 250  | ns   |
| Propagation Delay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | t <sub>PHL</sub> , t <sub>PLH</sub> | See Figure 2   | —   | —    | 35   | ns   |
| Pulse Width Distortion<br> t <sub>PLH</sub> - t <sub>PHL</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PWD                                 | See Figure 2   | —   | —    | 25   | ns   |
| Propagation Delay Skew <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | t <sub>PSK(P-P)</sub>               |                | —   | —    | 40   | ns   |
| Channel-Channel Skew                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | t <sub>PSK</sub>                    |                | —   | —    | 35   | ns   |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |                |     |      |      |      |
| <ol style="list-style-type: none"> <li>1. The nominal output impedance of an isolator driver channel is approximately 85 Ω, ±40%, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces.</li> <li>2. t<sub>PSK(P-P)</sub> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.</li> <li>3. See "3. Errata and Design Migration Guidelines" on page 24 for more details.</li> <li>4. Start-up time is the time period from the application of power to valid data at the output.</li> </ol> |                                     |                |     |      |      |      |

**Table 3. Electrical Characteristics (Continued)**

( $V_{DD1} = 5\text{ V} \pm 10\%$ ,  $V_{DD2} = 5\text{ V} \pm 10\%$ ,  $T_A = -40\text{ to }125\text{ }^\circ\text{C}$ ; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Symbol             | Test Condition                       | Min | Typ | Max | Unit              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------|-----|-----|-----|-------------------|
| <b>Si844xBx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                      |     |     |     |                   |
| Maximum Data Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                      | 0   | —   | 150 | Mbps              |
| Minimum Pulse Width                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                    |                                      | —   | —   | 6.0 | ns                |
| Propagation Delay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | $t_{PHL}, t_{PLH}$ | See Figure 2                         | 3.0 | 6.0 | 9.5 | ns                |
| Pulse Width Distortion<br>$ t_{PLH} - t_{PHL} $                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PWD                | See Figure 2                         | —   | 1.5 | 2.5 | ns                |
| Propagation Delay Skew <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | $t_{PSK(P-P)}$     |                                      | —   | 2.0 | 3.0 | ns                |
| Channel-Channel Skew                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | $t_{PSK}$          |                                      | —   | 0.5 | 1.8 | ns                |
| <b>All Models</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                                      |     |     |     |                   |
| Output Rise Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | $t_r$              | $C_L = 15\text{ pF}$<br>See Figure 2 | —   | 3.8 | 5.0 | ns                |
| Output Fall Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | $t_f$              | $C_L = 15\text{ pF}$<br>See Figure 2 | —   | 2.8 | 3.7 | ns                |
| Common Mode Transient Immunity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | CMTI               | $V_I = V_{DD}$ or $0\text{ V}$       | —   | 25  | —   | kV/ $\mu\text{s}$ |
| Enable to Data Valid <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | $t_{en1}$          | See Figure 1                         | —   | 5.0 | 8.0 | ns                |
| Enable to Data Tri-State <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | $t_{en2}$          | See Figure 1                         | —   | 7.0 | 9.2 | ns                |
| Start-up Time <sup>3,4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | $t_{SU}$           |                                      | —   | 15  | 40  | $\mu\text{s}$     |
| <b>Notes:</b> <ol style="list-style-type: none"> <li>1. The nominal output impedance of an isolator driver channel is approximately <math>85\ \Omega</math>, <math>\pm 40\%</math>, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces.</li> <li>2. <math>t_{PSK(P-P)}</math> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.</li> <li>3. See "3. Errata and Design Migration Guidelines" on page 24 for more details.</li> <li>4. Start-up time is the time period from the application of power to valid data at the output.</li> </ol> |                    |                                      |     |     |     |                   |

**Figure 1. ENABLE Timing Diagram****Figure 2. Propagation Delay Timing**

**Table 4. Electrical Characteristics**

( $V_{DD1} = 3.3 \text{ V} \pm 10\%$ ,  $V_{DD2} = 3.3 \text{ V} \pm 10\%$ ,  $T_A = -40 \text{ to } 125 \text{ }^\circ\text{C}$ ; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                            | Symbol           | Test Condition                     | Min                                       | Typ | Max | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------|-------------------------------------------|-----|-----|------|
| High Level Input Voltage                                                                                                                                                                                                                                                                                                                                                             | V <sub>IH</sub>  |                                    | 2.0                                       | —   | —   | V    |
| Low Level Input Voltage                                                                                                                                                                                                                                                                                                                                                              | V <sub>IL</sub>  |                                    | —                                         | —   | 0.8 | V    |
| High Level Output Voltage                                                                                                                                                                                                                                                                                                                                                            | V <sub>OH</sub>  | I <sub>oh</sub> = −4 mA            | V <sub>DD1</sub> , V <sub>DD2</sub> − 0.4 | 3.1 | —   | V    |
| Low Level Output Voltage                                                                                                                                                                                                                                                                                                                                                             | V <sub>OL</sub>  | I <sub>ol</sub> = 4 mA             | —                                         | 0.2 | 0.4 | V    |
| Input Leakage Current                                                                                                                                                                                                                                                                                                                                                                | I <sub>L</sub>   |                                    | —                                         | —   | ±10 | μA   |
| Output Impedance <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                        | Z <sub>O</sub>   |                                    | —                                         | 85  | —   | Ω    |
| Enable Input High Current                                                                                                                                                                                                                                                                                                                                                            | I <sub>ENH</sub> | V <sub>ENx</sub> = V <sub>IH</sub> | —                                         | 2.0 | —   | μA   |
| Enable Input Low Current                                                                                                                                                                                                                                                                                                                                                             | I <sub>ENL</sub> | V <sub>ENx</sub> = V <sub>IL</sub> | —                                         | 2.0 | —   | μA   |
| DC Supply Current (All inputs 0 V or at supply)                                                                                                                                                                                                                                                                                                                                      |                  |                                    |                                           |     |     |      |
| Si8440Ax, Bx and Si8445Bx                                                                                                                                                                                                                                                                                                                                                            |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 1.5 | 2.3 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.5 | 3.8 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 5.7 | 8.6 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 2.6 | 3.9 |      |
| Si8441Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 1.8 | 2.7 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.5 | 3.8 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 4.9 | 7.4 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 3.6 | 5.4 |      |
| Si8442Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.3 | 3.5 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 0 DC                    | —                                         | 2.3 | 3.5 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 4.5 | 6.8 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  | All inputs 1 DC                    | —                                         | 4.5 | 6.8 |      |
| 1 Mbps Supply Current (All inputs = 500 kHz square wave, C <sub>I</sub> = 15 pF on all outputs)                                                                                                                                                                                                                                                                                      |                  |                                    |                                           |     |     |      |
| Si8440Ax, Bx and Si8445Bx                                                                                                                                                                                                                                                                                                                                                            |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.6 | 5.4 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.0 | 3.9 |      |
| Si8441Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.5 | 5.3 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.4 | 5.1 |      |
| Si8442Ax, Bx                                                                                                                                                                                                                                                                                                                                                                         |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.6 | 5.4 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                     |                  |                                    | —                                         | 3.6 | 5.4 |      |
| Notes:                                                                                                                                                                                                                                                                                                                                                                               |                  |                                    |                                           |     |     |      |
| 1. The nominal output impedance of an isolator driver channel is approximately 85 Ω, ±40%, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces. |                  |                                    |                                           |     |     |      |
| 2. t <sub>PSK(P-P)</sub> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.                                                                                                                                                                                        |                  |                                    |                                           |     |     |      |
| 3. See "3. Errata and Design Migration Guidelines" on page 24 for more details.                                                                                                                                                                                                                                                                                                      |                  |                                    |                                           |     |     |      |
| 4. Start-up time is the time period from the application of power to valid data at the output.                                                                                                                                                                                                                                                                                       |                  |                                    |                                           |     |     |      |

**Table 4. Electrical Characteristics (Continued)**(V<sub>DD1</sub> = 3.3 V ±10%, V<sub>DD2</sub> = 3.3 V ±10%, T<sub>A</sub> = -40 to 125 °C; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Symbol                              | Test Condition | Min | Typ  | Max  | Unit |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------|-----|------|------|------|
| <b>10 Mbps Supply Current (All inputs = 5 MHz square wave, CI = 15 pF on all outputs)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |                |     |      |      |      |
| <b>Si8440Bx, Si8445Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 3.6  | 5.4  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.0  | 5.6  |      |
| <b>Si8441Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 3.7  | 5.5  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.1  | 5.7  |      |
| <b>Si8442Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.2  | 5.9  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 4.2  | 5.9  |      |
| <b>100 Mbps Supply Current (All inputs = 50 MHz square wave, CI = 15 pF on all outputs)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                     |                |     |      |      |      |
| <b>Si8440Bx, Si8445Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 3.6  | 5.5  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 14   | 17.5 |      |
| <b>Si8441Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 6.4  | 8.0  | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 11.4 | 14.5 |      |
| <b>Si8442Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 8.6  | 10.8 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                | —   | 8.6  | 10.8 |      |
| <b>Timing Characteristics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |                |     |      |      |      |
| <b>Si844xAx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                |     |      |      |      |
| Maximum Data Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                     |                | 0   | —    | 1.0  | Mbps |
| Minimum Pulse Width                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                     |                | —   | —    | 250  | ns   |
| Propagation Delay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | t <sub>PHL</sub> , t <sub>PLH</sub> | See Figure 2   | —   | —    | 35   | ns   |
| Pulse Width Distortion<br> t <sub>PLH</sub> - t <sub>PHL</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PWD                                 | See Figure 2   | —   | —    | 25   | ns   |
| Propagation Delay Skew <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | t <sub>PSK(P-P)</sub>               |                | —   | —    | 40   | ns   |
| Channel-Channel Skew                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | t <sub>PSK</sub>                    |                | —   | —    | 35   | ns   |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |                |     |      |      |      |
| <ol style="list-style-type: none"> <li>1. The nominal output impedance of an isolator driver channel is approximately 85 Ω, ±40%, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces.</li> <li>2. t<sub>PSK(P-P)</sub> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.</li> <li>3. See "3. Errata and Design Migration Guidelines" on page 24 for more details.</li> <li>4. Start-up time is the time period from the application of power to valid data at the output.</li> </ol> |                                     |                |     |      |      |      |

**Table 4. Electrical Characteristics (Continued)**(V<sub>DD1</sub> = 3.3 V ±10%, V<sub>DD2</sub> = 3.3 V ±10%, T<sub>A</sub> = -40 to 125 °C; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Symbol                              | Test Condition                          | Min | Typ | Max | Unit  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------|-----|-----|-----|-------|
| <b>Si844xBx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                     |                                         |     |     |     |       |
| Maximum Data Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                     |                                         | 0   | —   | 150 | Mbps  |
| Minimum Pulse Width                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                     |                                         | —   | —   | 6.0 | ns    |
| Propagation Delay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | t <sub>PHL</sub> , t <sub>PLH</sub> | See Figure 2                            | 3.0 | 6.0 | 9.5 | ns    |
| Pulse Width Distortion<br> t <sub>PLH</sub> - t <sub>PHL</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PWD                                 | See Figure 2                            | —   | 1.5 | 2.5 | ns    |
| Propagation Delay Skew <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | t <sub>PSK(P-P)</sub>               |                                         | —   | 2.0 | 3.0 | ns    |
| Channel-Channel Skew                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | t <sub>PSK</sub>                    |                                         | —   | 0.5 | 1.8 | ns    |
| <b>All Models</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                     |                                         |     |     |     |       |
| Output Rise Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | t <sub>r</sub>                      | C <sub>L</sub> = 15 pF<br>See Figure 2  | —   | 4.3 | 6.1 | ns    |
| Output Fall Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | t <sub>f</sub>                      | C <sub>L</sub> = 15 pF<br>See Figure 2  | —   | 3.0 | 4.3 | ns    |
| Common Mode Transient Immunity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | CMTI                                | V <sub>I</sub> = V <sub>DD</sub> or 0 V | —   | 25  | —   | kV/μs |
| Enable to Data Valid <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | t <sub>en1</sub>                    | See Figure 1                            | —   | 5.0 | 8.0 | ns    |
| Enable to Data Tri-State <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | t <sub>en2</sub>                    | See Figure 1                            | —   | 7.0 | 9.2 | ns    |
| Start-up Time <sup>3,4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | t <sub>SU</sub>                     |                                         | —   | 15  | 40  | μs    |
| <b>Notes:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |                                         |     |     |     |       |
| <ol style="list-style-type: none"> <li>1. The nominal output impedance of an isolator driver channel is approximately 85 Ω, ±40%, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces.</li> <li>2. t<sub>PSK(P-P)</sub> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.</li> <li>3. See "3. Errata and Design Migration Guidelines" on page 24 for more details.</li> <li>4. Start-up time is the time period from the application of power to valid data at the output.</li> </ol> |                                     |                                         |     |     |     |       |

**Table 5. Electrical Characteristics<sup>1</sup>**(V<sub>DD1</sub> = 2.70 V, V<sub>DD2</sub> = 2.70 V, T<sub>A</sub> = -40 to 125 °C; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Symbol           | Test Condition                     | Min                                       | Typ | Max | Unit |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------------------|-------------------------------------------|-----|-----|------|
| High Level Input Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | V <sub>IH</sub>  |                                    | 2.0                                       | —   | —   | V    |
| Low Level Input Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | V <sub>IL</sub>  |                                    | —                                         | —   | 0.8 | V    |
| High Level Output Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | V <sub>OH</sub>  | I <sub>oh</sub> = −4 mA            | V <sub>DD1</sub> , V <sub>DD2</sub> − 0.4 | 2.3 | —   | V    |
| Low Level Output Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | V <sub>OL</sub>  | I <sub>ol</sub> = 4 mA             | —                                         | 0.2 | 0.4 | V    |
| Input Leakage Current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | I <sub>L</sub>   |                                    | —                                         | —   | ±10 | μA   |
| Output Impedance <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Z <sub>O</sub>   |                                    | —                                         | 85  | —   | Ω    |
| Enable Input High Current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | I <sub>ENH</sub> | V <sub>ENx</sub> = V <sub>IH</sub> | —                                         | 2.0 | —   | μA   |
| Enable Input Low Current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | I <sub>ENL</sub> | V <sub>ENx</sub> = V <sub>IL</sub> | —                                         | 2.0 | —   | μA   |
| DC Supply Current (All inputs 0 V or at supply)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                  |                                    |                                           |     |     |      |
| Si8440Ax, Bx and Si8445Bx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 0 DC                    | —                                         | 1.5 | 2.3 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 0 DC                    | —                                         | 2.5 | 3.8 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 1 DC                    | —                                         | 5.7 | 8.6 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 1 DC                    | —                                         | 2.6 | 3.9 |      |
| Si8441Ax, Bx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 0 DC                    | —                                         | 1.8 | 2.7 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 0 DC                    | —                                         | 2.5 | 3.8 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 1 DC                    | —                                         | 4.9 | 7.4 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 1 DC                    | —                                         | 3.6 | 5.4 |      |
| Si8442Ax, Bx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 0 DC                    | —                                         | 2.3 | 3.5 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 0 DC                    | —                                         | 2.3 | 3.5 |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 1 DC                    | —                                         | 4.5 | 6.8 |      |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  | All inputs 1 DC                    | —                                         | 4.5 | 6.8 |      |
| 1 Mbps Supply Current (All inputs = 500 kHz square wave, CI = 15 pF on all outputs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                                    |                                           |     |     |      |
| Si8440Ax, Bx and Si8445Bx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                    | —                                         | 3.6 | 5.4 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                    | —                                         | 3.0 | 3.9 |      |
| Si8441Ax, Bx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                    | —                                         | 3.5 | 5.3 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                    | —                                         | 3.4 | 5.1 |      |
| Si8442Ax, Bx                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                  |                                    |                                           |     |     |      |
| V <sub>DD1</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                    | —                                         | 3.6 | 5.4 | mA   |
| V <sub>DD2</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                  |                                    | —                                         | 3.6 | 5.4 |      |
| <div>1. Specifications in this table are also valid at VDD1 = 2.6 V and VDD2 = 2.6 V when the operating temperature range is constrained to T<sub>A</sub> = 0 to 85 °C.</div> <div>2. The nominal output impedance of an isolator driver channel is approximately 85 Ω, ±40%, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces.</div> <div>3. t<sub>PSK(P-P)</sub> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.</div> <div>4. See "3. Errata and Design Migration Guidelines" on page 24 for more details.</div> <div>5. Start-up time is the time period from the application of power to valid data at the output.</div> |                  |                                    |                                           |     |     |      |

**Table 5. Electrical Characteristics<sup>1</sup> (Continued)**

( $V_{DD1} = 2.70\text{ V}$ ,  $V_{DD2} = 2.70\text{ V}$ ,  $T_A = -40\text{ to }125\text{ }^{\circ}\text{C}$ ; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Symbol             | Test Condition | Min | Typ  | Max  | Unit |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------|-----|------|------|------|
| <b>10 Mbps Supply Current (All inputs = 5 MHz square wave, CI = 15 pF on all outputs)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                |     |      |      |      |
| <b>Si8440Bx, Si8445Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                |     |      |      |      |
| $V_{DD1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 3.6  | 5.4  | mA   |
| $V_{DD2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 4.0  | 5.6  |      |
| <b>Si8441Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                |     |      |      |      |
| $V_{DD1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 3.7  | 5.5  | mA   |
| $V_{DD2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 4.1  | 5.7  |      |
| <b>Si8442Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                |     |      |      |      |
| $V_{DD1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 4.2  | 5.9  | mA   |
| $V_{DD2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 4.2  | 5.9  |      |
| <b>100 Mbps Supply Current (All inputs = 50 MHz square wave, CI = 15 pF on all outputs)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |                |     |      |      |      |
| <b>Si8440Bx, Si8445Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                |     |      |      |      |
| $V_{DD1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 3.6  | 5.5  | mA   |
| $V_{DD2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 10.8 | 13.5 |      |
| <b>Si8441Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                |     |      |      |      |
| $V_{DD1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 5.6  | 7.0  | mA   |
| $V_{DD2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 9.3  | 11.6 |      |
| <b>Si8442Bx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                |     |      |      |      |
| $V_{DD1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 7.2  | 9.0  | mA   |
| $V_{DD2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |                | —   | 7.2  | 9.0  |      |
| <b>Timing Characteristics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |                |     |      |      |      |
| <b>Si844xAx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                |     |      |      |      |
| Maximum Data Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                | 0   | —    | 1.0  | Mbps |
| Minimum Pulse Width                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |                | —   | —    | 250  | ns   |
| Propagation Delay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | $t_{PHL}, t_{PLH}$ | See Figure 2   | —   | —    | 35   | ns   |
| Pulse Width Distortion<br>$ t_{PLH} - t_{PHL} $                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | PWD                | See Figure 2   | —   | —    | 25   | ns   |
| Propagation Delay Skew <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | $t_{PSK(P-P)}$     |                | —   | —    | 40   | ns   |
| Channel-Channel Skew                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | $t_{PSK}$          |                | —   | —    | 35   | ns   |
| <ol style="list-style-type: none"> <li>Specifications in this table are also valid at <math>V_{DD1} = 2.6\text{ V}</math> and <math>V_{DD2} = 2.6\text{ V}</math> when the operating temperature range is constrained to <math>T_A = 0\text{ to }85\text{ }^{\circ}\text{C}</math>.</li> <li>The nominal output impedance of an isolator driver channel is approximately <math>85\text{ }\Omega</math>, <math>\pm 40\%</math>, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces.</li> <li><math>t_{PSK(P-P)}</math> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.</li> <li>See "3. Errata and Design Migration Guidelines" on page 24 for more details.</li> <li>Start-up time is the time period from the application of power to valid data at the output.</li> </ol> |                    |                |     |      |      |      |

**Table 5. Electrical Characteristics<sup>1</sup> (Continued)**(V<sub>DD1</sub> = 2.70 V, V<sub>DD2</sub> = 2.70 V, T<sub>A</sub> = -40 to 125 °C; applies to narrow and wide-body SOIC packages)

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Symbol                              | Test Condition                          | Min | Typ | Max | Unit  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------|-----|-----|-----|-------|
| <b>Si844xBx</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                     |                                         |     |     |     |       |
| Maximum Data Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                                         | 0   | —   | 150 | Mbps  |
| Minimum Pulse Width                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                     |                                         | —   | —   | 6.0 | ns    |
| Propagation Delay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | t <sub>PHL</sub> , t <sub>PLH</sub> | See Figure 2                            | 3.0 | 6.0 | 9.5 | ns    |
| Pulse Width Distortion<br> t <sub>PLH</sub> - t <sub>PHL</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | PWD                                 | See Figure 2                            | —   | 1.5 | 2.5 | ns    |
| Propagation Delay Skew <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | t <sub>PSK(P-P)</sub>               |                                         | —   | 2.0 | 3.0 | ns    |
| Channel-Channel Skew                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | t <sub>PSK</sub>                    |                                         | —   | 0.5 | 1.8 | ns    |
| <b>All Models</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                                         |     |     |     |       |
| Output Rise Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | t <sub>r</sub>                      | C <sub>L</sub> = 15 pF<br>See Figure 2  | —   | 4.8 | 6.5 | ns    |
| Output Fall Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | t <sub>f</sub>                      | C <sub>L</sub> = 15 pF<br>See Figure 2  | —   | 3.2 | 4.6 | ns    |
| Common Mode Transient Immunity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | CMTI                                | V <sub>I</sub> = V <sub>DD</sub> or 0 V | —   | 25  | —   | kV/μs |
| Enable to Data Valid <sup>4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | t <sub>en1</sub>                    | See Figure 1                            | —   | 5.0 | 8.0 | ns    |
| Enable to Data Tri-State <sup>4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | t <sub>en2</sub>                    | See Figure 1                            | —   | 7.0 | 9.2 | ns    |
| Start-up Time <sup>4,5</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | t <sub>SU</sub>                     |                                         | —   | 15  | 40  | μs    |
| <ol style="list-style-type: none"> <li>Specifications in this table are also valid at VDD1 = 2.6 V and VDD2 = 2.6 V when the operating temperature range is constrained to T<sub>A</sub> = 0 to 85 °C.</li> <li>The nominal output impedance of an isolator driver channel is approximately 85 Ω, ±40%, which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces.</li> <li>t<sub>PSK(P-P)</sub> is the magnitude of the difference in propagation delay times measured between different units operating at the same supply voltages, load, and ambient temperature.</li> <li>See "3. Errata and Design Migration Guidelines" on page 24 for more details.</li> <li>Start-up time is the time period from the application of power to valid data at the output.</li> </ol> |                                     |                                         |     |     |     |       |

**Table 6. Regulatory Information\***

|                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CSA</b>                                                                                                                                                                                                     |
| The Si84xx is certified under CSA Component Acceptance Notice 5A. For more details, see File 232873.                                                                                                           |
| 61010-1: Up to 600 V <sub>RMS</sub> reinforced insulation working voltage; up to 600 V <sub>RMS</sub> basic insulation working voltage.                                                                        |
| 60950-1: Up to 130 V <sub>RMS</sub> reinforced insulation working voltage; up to 1000 V <sub>RMS</sub> basic insulation working voltage.                                                                       |
| <b>VDE</b>                                                                                                                                                                                                     |
| The Si84xx is certified according to IEC 60747-5-2. For more details, see File 5006301-4880-0001.                                                                                                              |
| 60747-5-2: Up to 560 V <sub>peak</sub> for basic insulation working voltage.                                                                                                                                   |
| <b>UL</b>                                                                                                                                                                                                      |
| The Si84xx is certified under UL1577 component recognition program. For more details, see File E257455.                                                                                                        |
| Rated up to 2500 V <sub>RMS</sub> isolation voltage for basic insulation.                                                                                                                                      |
| <b>*Note:</b> Regulatory Certifications apply to 2.5 kV <sub>RMS</sub> rated devices which are production tested to 3.0 kV <sub>RMS</sub> for 1 sec. For more information, see "5. Ordering Guide" on page 26. |

**Table 7. Insulation and Safety-Related Specifications**

| Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Symbol          | Test Condition | Value            |                  | Unit             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------|------------------|------------------|------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                | WB SOIC-16       | NB SOIC-16       |                  |
| Nominal Air Gap (Clearance) <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | L(IO1)          |                | 8.0              | 4.9              | mm               |
| Nominal External Tracking (Creepage) <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | L(IO2)          |                | 8.0              | 4.01             | mm               |
| Minimum Internal Gap (Internal Clearance)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |                | 0.008            | 0.008            | mm               |
| Tracking Resistance (Proof Tracking Index)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | PTI             | IEC60112       | 600              | 600              | V <sub>RMS</sub> |
| Erosion Depth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ED              |                | 0.040            | 0.019            | mm               |
| Resistance (Input-Output) <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | R <sub>IO</sub> |                | 10 <sup>12</sup> | 10 <sup>12</sup> | Ω                |
| Capacitance (Input-Output) <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | C <sub>IO</sub> | f = 1 MHz      | 2.0              | 2.0              | pF               |
| Input Capacitance <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | C <sub>I</sub>  |                | 4.0              | 4.0              | pF               |
| <b>Notes:</b> <ol style="list-style-type: none"> <li>The values in this table correspond to the nominal creepage and clearance values as detailed in "6. Package Outline: 16-Pin Wide Body SOIC" and "8. Package Outline: 16-Pin Narrow Body SOIC". VDE certifies the clearance and creepage limits as 4.7 mm minimum for the NB SOIC-16 package and 8.5 mm minimum for the WB SOIC-16 package. UL does not impose a clearance and creepage minimum for component level certifications. CSA certifies the clearance and creepage limits as 3.9 mm minimum for the NB SOIC-16 package and 7.6 mm minimum for the WB SOIC-16 package.</li> <li>To determine resistance and capacitance, the Si84xx is converted into a 2-terminal device. Pins 1–8 are shorted together to form the first terminal and pins 9–16 are shorted together to form the second terminal. The parameters are then measured between these two terminals.</li> <li>Measured from input pin to ground.</li> </ol> |                 |                |                  |                  |                  |

Table 8. IEC 60664-1 (VDE 0844 Part 2) Ratings

| Parameter                   | Test Condition                          | Specification |
|-----------------------------|-----------------------------------------|---------------|
| Basic Isolation Group       | Material Group                          | I             |
| Installation Classification | Rated Mains Voltages $\leq 150 V_{RMS}$ | I-IV          |
|                             | Rated Mains Voltages $\leq 300 V_{RMS}$ | I-III         |
|                             | Rated Mains Voltages $\leq 400 V_{RMS}$ | I-II          |
|                             | Rated Mains Voltages $\leq 600 V_{RMS}$ | I-II          |

Table 9. IEC 60747-5-2 Insulation Characteristics for Si84xxxB\*

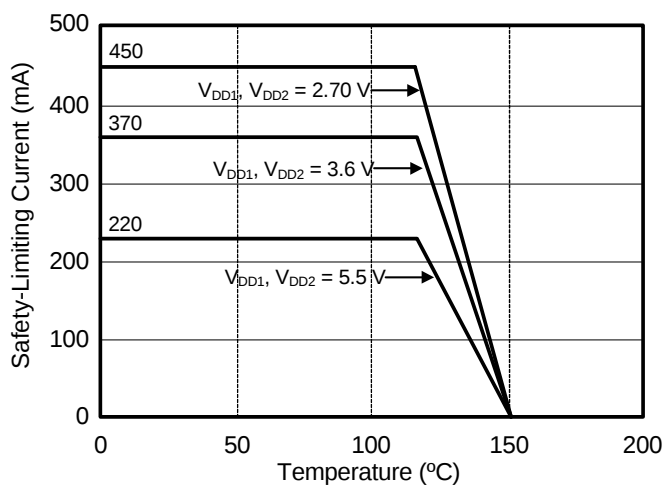
| Parameter                                                                                                                           | Symbol     | Test Condition                                                                                                           | Characteristic | Unit     |
|-------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------|----------------|----------|
| Maximum Working Insulation Voltage                                                                                                  | $V_{IORM}$ |                                                                                                                          | 560            | V peak   |
| Input to Output Test Voltage                                                                                                        | $V_{PR}$   | Method b1<br>( $V_{IORM} \times 1.875 = V_{PR}$ , 100%<br>Production Test, $t_m = 1$ sec,<br>Partial Discharge $< 5$ pC) | 1050           | V peak   |
| Transient Overvoltage                                                                                                               | $V_{IOTM}$ | $t = 60$ sec                                                                                                             | 4000           | V peak   |
| Pollution Degree (DIN VDE 0110, Table 1)                                                                                            |            |                                                                                                                          | 2              |          |
| Insulation Resistance at $T_S$ , $V_{IO} = 500$ V                                                                                   | $R_S$      |                                                                                                                          | $>10^9$        | $\Omega$ |
| *Note: Maintenance of the safety data is ensured by protective circuits. The Si84xx provides a climate classification of 40/125/21. |            |                                                                                                                          |                |          |

Table 10. IEC Safety Limiting Values<sup>1</sup>

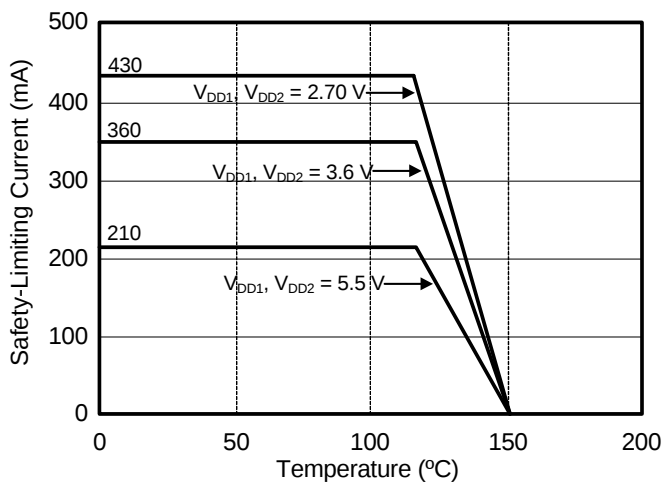
| Parameter                                                                                                                                                                                                                                                                       | Symbol | Test Condition                                                                                                                                                                                  | Min | Typ | Max           |               | Unit               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---------------|---------------|--------------------|
|                                                                                                                                                                                                                                                                                 |        |                                                                                                                                                                                                 |     |     | WB<br>SOIC-16 | NB<br>SOIC-16 |                    |
| Case Temperature                                                                                                                                                                                                                                                                | $T_S$  |                                                                                                                                                                                                 | —   | —   | 150           | 150           | $^{\circ}\text{C}$ |
| Safety input, output, or supply current                                                                                                                                                                                                                                         | $I_S$  | $\theta_{JA} = 100$ $^{\circ}\text{C}/\text{W}$ (WB SOIC-16),<br>105 $^{\circ}\text{C}/\text{W}$ (NB SOIC-16),<br>$V_I = 5.5$ V, $T_J = 150$ $^{\circ}\text{C}$ , $T_A = 25$ $^{\circ}\text{C}$ | —   | —   | 220           | 210           | mA                 |
| Device Power Dissipation <sup>2</sup>                                                                                                                                                                                                                                           | $P_D$  |                                                                                                                                                                                                 | —   | —   | 275           | 275           | mW                 |
| <b>Notes:</b><br>1. Maximum value allowed in the event of a failure; also see the thermal derating curve in Figures 3 and 4.<br>2. The Si844x is tested with $VDD1 = VDD2 = 5.5$ V, $T_J = 150$ $^{\circ}\text{C}$ , $CL = 15$ pF, input a 150 Mbps 50% duty cycle square wave. |        |                                                                                                                                                                                                 |     |     |               |               |                    |

**Table 11. Thermal Characteristics**

| Parameter                             | Symbol        | Test Condition | Min | Typ        |            | Max | Unit |
|---------------------------------------|---------------|----------------|-----|------------|------------|-----|------|
|                                       |               |                |     | WB SOIC-16 | NB SOIC-16 |     |      |
| IC Junction-to-Air Thermal Resistance | $\theta_{JA}$ |                | —   | 100        | 105        | —   | °C/W |



**Figure 3. (WB SOIC-16) Thermal Derating Curve, Dependence of Safety Limiting Values with Case Temperature per DIN EN 60747-5-2**

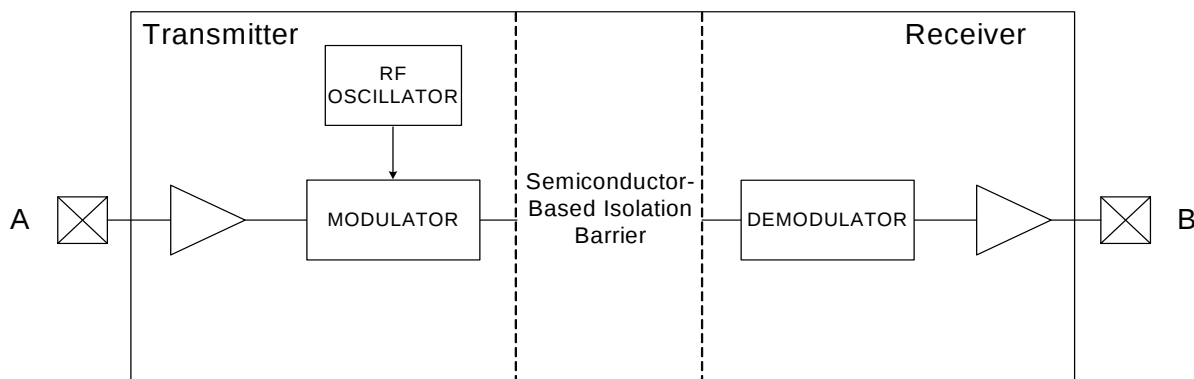


**Figure 4. (NB SOIC-16) Thermal Derating Curve, Dependence of Safety Limiting Values with Case Temperature per DIN EN 60747-5-2**

## 2. Functional Description

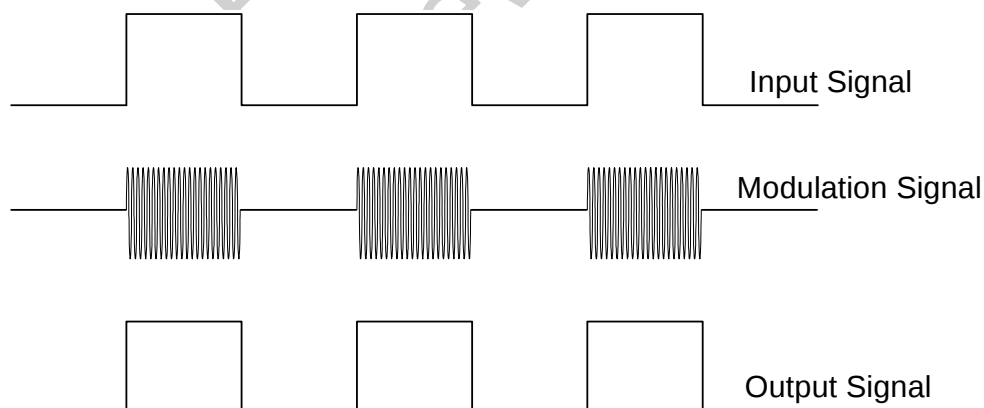
### 2.1. Theory of Operation

The operation of an Si844x channel is analogous to that of an opto coupler, except an RF carrier is modulated instead of light. This simple architecture provides a robust isolated data path and requires no special considerations or initialization at start-up. A simplified block diagram for a single Si844x channel is shown in Figure 5.



**Figure 5. Simplified Channel Diagram**

A channel consists of an RF Transmitter and RF Receiver separated by a semiconductor-based isolation barrier. Referring to the Transmitter, input A modulates the carrier provided by an RF oscillator using on/off keying. The Receiver contains a demodulator that decodes the input state according to its RF energy content and applies the result to output B via the output driver. This RF on/off keying scheme is superior to pulse code schemes as it provides best-in-class noise immunity, low power consumption, and better immunity to magnetic fields. See Figure 6 for more details.



**Figure 6. Modulation Scheme**

## 2.2. Eye Diagram

Figure 7 illustrates an eye-diagram taken on an Si8440. For the data source, the test used an Anritsu (MP1763C) Pulse Pattern Generator set to 1000 ns/div. The output of the generator's clock and data from an Si8440 were captured on an oscilloscope. The results illustrate that data integrity was maintained even at the high data rate of 150 Mbps. The results also show that 2 ns pulse width distortion and 250 ps peak jitter were exhibited.

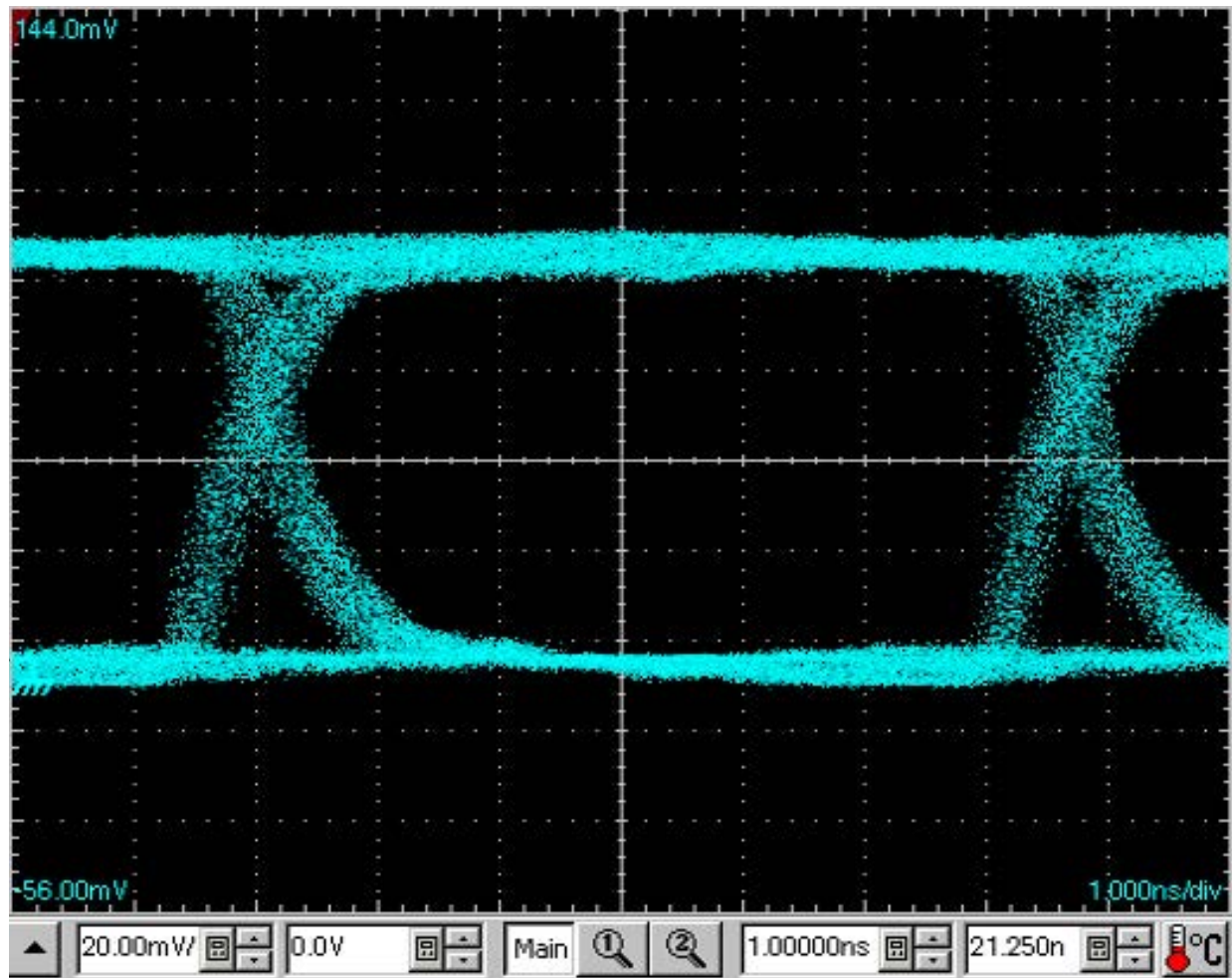


Figure 7. Eye Diagram

## 2.3. Device Operation

Device behavior during start-up, normal operation, and shutdown is shown in Table 12. Table 13 provides an overview of the output states when the Enable pins are active.

**Table 12. Si84xx Logic Operation Table**

| V <sub>I</sub><br>Input <sup>1,2</sup> | EN<br>Input <sup>1,2,3,4</sup> | VDDI<br>State <sup>1,5,6</sup> | VDDO<br>State <sup>1,5,6</sup> | V <sub>O</sub> Output <sup>1,2</sup> | Comments                                                                                                                                                                                                                                                                             |
|----------------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H                                      | H or NC                        | P                              | P                              | H                                    | Enabled, normal operation.                                                                                                                                                                                                                                                           |
| L                                      | H or NC                        | P                              | P                              | L                                    |                                                                                                                                                                                                                                                                                      |
| X <sup>7</sup>                         | L                              | P                              | P                              | Hi-Z or L <sup>8</sup>               | Disabled.                                                                                                                                                                                                                                                                            |
| X <sup>7</sup>                         | H or NC                        | UP                             | P                              | L                                    | Upon transition of VDDI from unpowered to powered, V <sub>O</sub> returns to the same state as V <sub>I</sub> in less than 1 $\mu$ s.                                                                                                                                                |
| X <sup>7</sup>                         | L                              | UP                             | P                              | Hi-Z or L <sup>8</sup>               | Disabled.                                                                                                                                                                                                                                                                            |
| X <sup>7</sup>                         | X <sup>7</sup>                 | P                              | UP                             | Undetermined                         | Upon transition of VDDO from unpowered to powered, V <sub>O</sub> returns to the same state as V <sub>I</sub> within 1 $\mu$ s, if EN is in either the H or NC state. Upon transition of VDDO from unpowered to powered, V <sub>O</sub> returns to Hi-Z within 1 $\mu$ s if EN is L. |

**Notes:**

1. VDDI and VDDO are the input and output power supplies. V<sub>I</sub> and V<sub>O</sub> are the respective input and output terminals. EN is the enable control input located on the same output side.
2. X = not applicable; H = Logic High; L = Logic Low; Hi-Z = High Impedance.
3. It is recommended that the enable inputs be connected to an external logic high or low level when the Si84xx is operating in noisy environments.
4. No Connect (NC) replaces EN1 on Si8440/45. No Connect replaces EN2 on the Si8445. No Connects are not internally connected and can be left floating, tied to VDD, or tied to GND.
5. "Powered" state (P) is defined as 2.70 V < VDD < 5.5 V.
6. "Unpowered" state (UP) is defined as VDD = 0 V.
7. Note that an I/O can power the die for a given side through an internal diode if its source has adequate current.
8. When using the enable pin (EN) function, the output pin state is driven to a logic low state when the EN pin is disabled (EN = 0) in Revision C. Revision D outputs go into a high-impedance state when the EN pin is disabled (EN = 0). See "3. Errata and Design Migration Guidelines" on page 24 for more details.

Table 13. Enable Input Truth Table<sup>1</sup>

| P/N    | EN1 <sup>1,2</sup> | EN2 <sup>1,2</sup> | Operation                                                                                  |
|--------|--------------------|--------------------|--------------------------------------------------------------------------------------------|
| Si8440 | —                  | H                  | Outputs B1, B2, B3, B4 are enabled and follow the input state.                             |
|        | —                  | L                  | Outputs B1, B2, B3, B4 are disabled and Logic Low or in high impedance state. <sup>3</sup> |
| Si8441 | H                  | X                  | Output A4 enabled and follows the input state.                                             |
|        | L                  | X                  | Output A4 disabled and Logic Low or in high impedance state. <sup>3</sup>                  |
|        | X                  | H                  | Outputs B1, B2, B3 are enabled and follow the input state.                                 |
|        | X                  | L                  | Outputs B1, B2, B3 are disabled and Logic Low or in high impedance state. <sup>3</sup>     |
| Si8442 | H                  | X                  | Outputs A3 and A4 are enabled and follow the input state.                                  |
|        | L                  | X                  | Outputs A3 and A4 are disabled and Logic Low or in high impedance state. <sup>3</sup>      |
|        | X                  | H                  | Outputs B1 and B2 are enabled and follow the input state.                                  |
|        | X                  | L                  | Outputs B1 and B2 are disabled and Logic Low or in high impedance state. <sup>3</sup>      |
| Si8445 | —                  | —                  | Outputs B1, B2, B3, B4 are enabled and follow the input state.                             |

**Notes:**

1. Enable inputs EN1 and EN2 can be used for multiplexing, for clock sync, or other output control. EN1, EN2 logic operation is summarized for each isolator product in Table 13. These inputs are internally pulled-up to local VDD by a 3  $\mu$ A current source allowing them to be connected to an external logic level (high or low) or left floating. To minimize noise coupling, do not connect circuit traces to EN1 or EN2 if they are left floating. If EN1, EN2 are unused, it is recommended they be connected to an external logic level, especially if the Si84xx is operating in a noisy environment.
2. X = not applicable; H = Logic High; L = Logic Low.
3. When using the enable pin (EN) function, the output pin state is driven to a logic low state when the EN pin is disabled (EN = 0) in Revision C. Revision D outputs go into a high-impedance state when the EN pin is disabled (EN = 0). See "3. Errata and Design Migration Guidelines" on page 24 for more details.

## 2.4. Layout Recommendations

To ensure safety in the end user application, high voltage circuits (i.e., circuits with  $>30\text{ V}_{AC}$ ) must be physically separated from the safety extra-low voltage circuits (SELV is a circuit with  $<30\text{ V}_{AC}$ ) by a certain distance (creepage/clearance). If a component, such as a digital isolator, straddles this isolation barrier, it must meet those creepage/clearance requirements and also provide a sufficiently large high-voltage breakdown protection rating (commonly referred to as working voltage protection). Table 6 on page 14 and Table 7 on page 14 detail the working voltage and creepage/clearance capabilities of the Si84xx. These tables also detail the component standards (UL1577, IEC60747, CSA 5A), which are readily accepted by certification bodies to provide proof for end-system specifications requirements. Refer to the end-system specification (61010-1, 60950-1, etc.) requirements before starting any design that uses a digital isolator.

The following sections detail the recommended bypass and decoupling components necessary to ensure robust overall performance and reliability for systems using the Si84xx digital isolators.

### 2.4.1. Supply Bypass

Digital integrated circuit components typically require  $0.1\text{ }\mu\text{F}$  ( $100\text{ nF}$ ) bypass capacitors when used in electrically quiet environments. However, digital isolators are commonly used in hazardous environments with excessively noisy power supplies. To counteract these harsh conditions, it is recommended that an additional  $1\text{ }\mu\text{F}$  bypass capacitor be added between VDD and GND on both sides of the package. The capacitors should be placed as close as possible to the package to minimize stray inductance. If the system is excessively noisy, it is recommended that the designer add  $50$  to  $100\text{ }\Omega$  resistors in series with the VDD supply voltage source and  $50$  to  $300\text{ }\Omega$  resistors in series with the digital inputs/outputs (see Figure 8). For more details, see "3. Errata and Design Migration Guidelines" on page 24.

All components upstream or downstream of the isolator should be properly decoupled as well. If these components are not properly decoupled, their supply noise can couple to the isolator inputs and outputs, potentially causing damage if spikes exceed the maximum ratings of the isolator ( $6\text{ V}$ ). In this case, the  $50$  to  $300\text{ }\Omega$  resistors protect the isolator's inputs/outputs (note that permanent device damage may occur if the absolute maximum ratings are exceeded). Functional operation should be restricted to the conditions specified in Table 1, "Recommended Operating Conditions," on page 3.

### 2.4.2. Pin Connections

No connect pins are not internally connected. They can be left floating, tied to  $V_{DD}$ , or tied to GND.

### 2.4.3. Output Pin Termination

The nominal output impedance of an isolator driver channel is approximately  $85\text{ }\Omega$ ,  $\pm 40\%$ , which is a combination of the value of the on-chip series termination resistor and channel resistance of the output driver FET. When driving loads where transmission line effects will be a factor, output pins should be appropriately terminated with controlled impedance PCB traces. The series termination resistor values should be scaled appropriately while keeping in mind the recommendations described in "2.4.1. Supply Bypass" above.

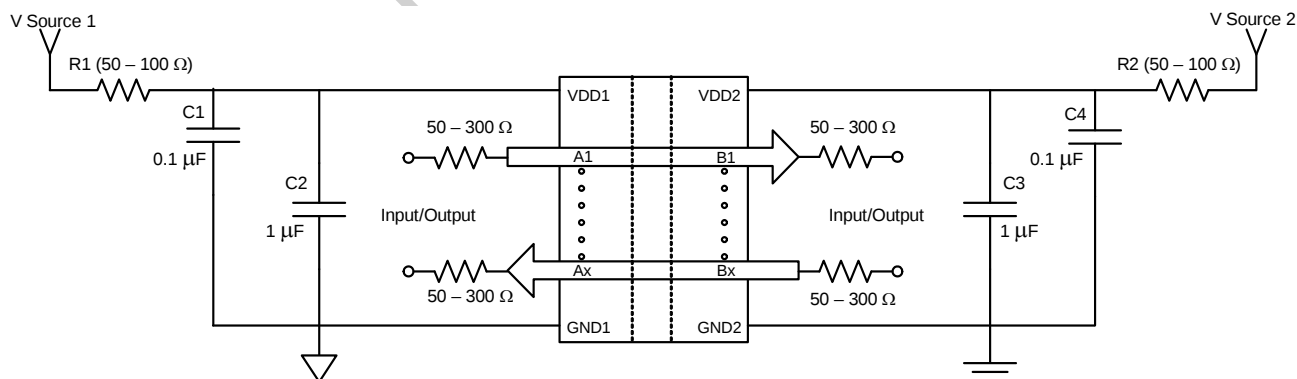


Figure 8. Recommended Bypass Components for the Si84xx Digital Isolator Family

## 2.5. Typical Performance Characteristics

The typical performance characteristics depicted in the following diagrams are for information purposes only. Refer to Tables 3, 4, and 5 for actual specification limits.

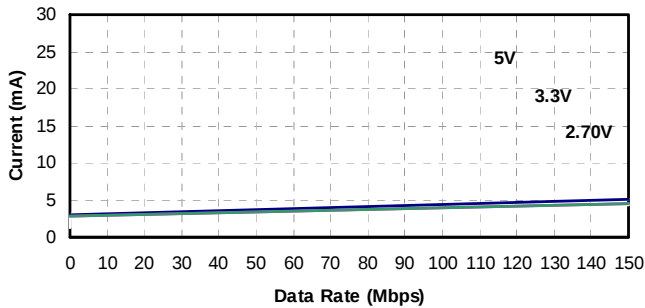


Figure 9. Si8440/45 Typical  $V_{DD1}$  Supply Current vs. Data Rate 5, 3.3, and 2.70 V Operation

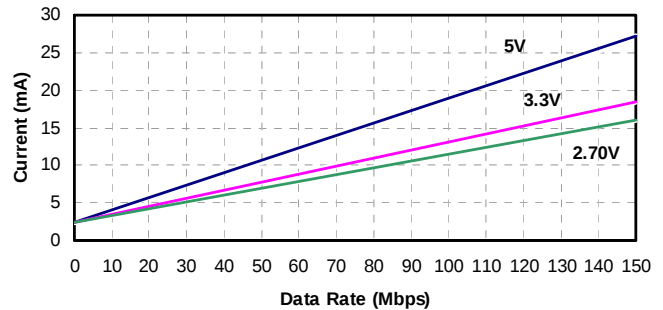


Figure 12. Si8440/45 Typical  $V_{DD2}$  Supply Current vs. Data Rate 5, 3.3, and 2.70 V Operation

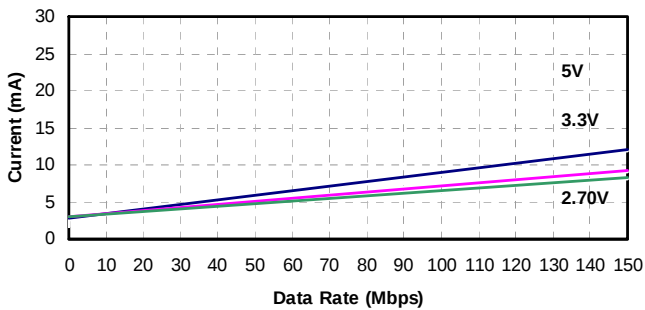


Figure 10. Si8441 Typical  $V_{DD1}$  Supply Current vs. Data Rate 5, 3.3, and 2.70 V Operation

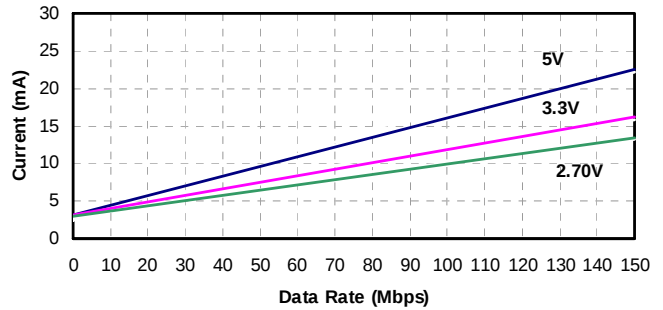


Figure 13. Si8441 Typical  $V_{DD2}$  Supply Current vs. Data Rate 5, 3.3, and 2.70 V Operation (15 pF Load)

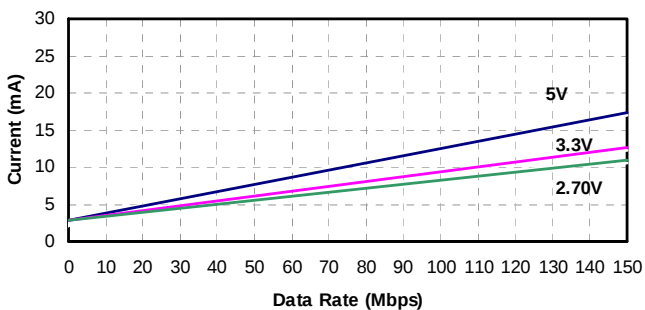


Figure 11. Si8442 Typical  $V_{DD1}$  or  $V_{DD2}$  Supply Current vs. Data Rate 5, 3.3, and 2.70 V Operation (15 pF Load)

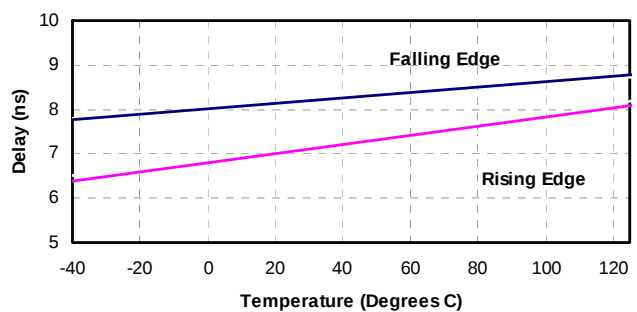


Figure 14. Propagation Delay vs. Temperature



Figure 15. Si84xx Time-Dependent Dielectric Breakdown

## 3. Errata and Design Migration Guidelines

The following errata apply to Revision C devices only. See "5. Ordering Guide" on page 26 for more details. No errata exist for Revision D devices.

### 3.1. Enable Pin Causes Outputs to Go Low (Revision C Only)

When using the enable pin (EN1, EN2) function on the 4-channel (Si8440/1/2) isolators, the corresponding output pin states (pin = An, Bn, where n can be 1...4) are driven to a logic low (to ground) when the enable pin is disabled (EN1 or EN2 = 0). This functionality is different from the legacy 4-channel (Si8440/1/2) isolators. On those devices, the isolator outputs go into a high-impedance state (Hi-Z) when the enable pin is disabled (EN1 = 0 or EN2 = 0).

#### 3.1.1. Resolution

The enable pin functionality causing the outputs to go low is supported in production for Revision C of the Si844x devices. Revision D corrects the enable pin functionality (i.e., the outputs will go into the high-impedance state to match the legacy isolator products). Refer to the Ordering Guide sections of the data sheet(s) for current ordering information.

### 3.2. Power Supply Bypass Capacitors (Revision C and Revision D)

When using the Si844x isolators with power supplies  $\geq 4.5$  V, sufficient VDD bypass capacitors must be present on both the VDD1 and VDD2 pins to ensure the VDD rise time is less than  $0.5 \text{ V}/\mu\text{s}$  (which is  $> 9 \mu\text{s}$  for a  $\geq 4.5$  V supply). Although rise time is power supply dependent,  $\geq 1 \mu\text{F}$  capacitors are required on both power supply pins (VDD1, VDD2) of the isolator device.

#### 3.2.1. Resolution

For recommendations on resolving this issue, see "2.4.1. Supply Bypass" on page 21. Additionally, refer to "5. Ordering Guide" on page 26 for current ordering information.

### 3.3. Latch Up Immunity (Revision C Only)

Latch up immunity generally exceeds  $\pm 200 \text{ mA}$  per pin. Exceptions: Certain pins provide  $< 100 \text{ mA}$  of latch-up immunity. To increase latch-up immunity on these pins,  $100 \Omega$  of equivalent resistance must be included in series with *all* of the pins listed in Table 14. The  $100 \Omega$  equivalent resistance can be comprised of the source driver's output resistance and a series termination resistor. The Si8441 is not affected when using power supply voltages (VDD1 and VDD2)  $\leq 3.5 \text{ V}$ .

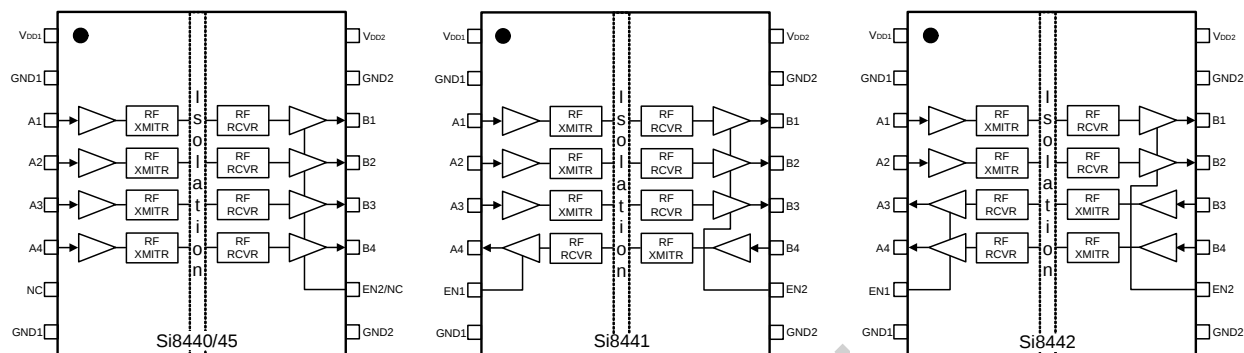
#### 3.3.1. Resolution

This issue has been corrected with Revision D of the device. Refer to "5. Ordering Guide" for current ordering information.

**Table 14. Affected Ordering Part Numbers (Revision C Only)**

| Affected Ordering Part Numbers*                            | Device Revision | Pin# | Name | Pin Type        |
|------------------------------------------------------------|-----------------|------|------|-----------------|
| SI8440SV-C-IS/IS1, SI8441SV-C-IS/IS1, SI8442SV-C-IS/IS1    | C               | 6    | A4   | Input or Output |
|                                                            |                 | 10   | EN2  | Input           |
|                                                            |                 | 14   | B1   | Output          |
| SI8445SV-C-IS/IS1                                          | C               | 6    | A4   | Input           |
|                                                            |                 | 14   | B1   | Output          |
| *Note: SV = Speed Grade/Isolation Rating (AA, AB, BA, BB). |                 |      |      |                 |

## 4. Pin Descriptions



| Name                | SOIC-16 Pin# | Type           | Description <sup>1</sup>                    |
|---------------------|--------------|----------------|---------------------------------------------|
| V <sub>DD1</sub>    | 1            | Supply         | Side 1 power supply.                        |
| GND1                | 2            | Ground         | Side 1 ground.                              |
| A1                  | 3            | Digital Input  | Side 1 digital input.                       |
| A2                  | 4            | Digital Input  | Side 1 digital input.                       |
| A3                  | 5            | Digital I/O    | Side 1 digital input or output.             |
| A4                  | 6            | Digital I/O    | Side 1 digital input or output.             |
| EN1/NC <sup>2</sup> | 7            | Digital Input  | Side 1 active high enable. NC on Si8440/45. |
| GND1                | 8            | Ground         | Side 1 ground.                              |
| GND2                | 9            | Ground         | Side 2 ground.                              |
| EN2/NC <sup>2</sup> | 10           | Digital Input  | Side 2 active high enable. NC on Si8445.    |
| B4                  | 11           | Digital I/O    | Side 2 digital input or output.             |
| B3                  | 12           | Digital I/O    | Side 2 digital input or output.             |
| B2                  | 13           | Digital Output | Side 2 digital output.                      |
| B1                  | 14           | Digital Output | Side 2 digital output.                      |
| GND2                | 15           | Ground         | Side 2 ground.                              |
| V <sub>DD2</sub>    | 16           | Supply         | Side 2 power supply.                        |

**Notes:**

- For narrow-body devices, Pin 2 and Pin 8 GND must be externally connected to respective ground. Pin 9 and Pin 15 must also be connected to external ground.
- No Connect. These pins are not internally connected. They can be left floating, tied to V<sub>DD</sub> or tied to GND.

## 5. Ordering Guide

These devices are not recommended for new designs. Please see the Si864x datasheet for replacement options.

**Table 15. Ordering Guide for Valid OPNs<sup>1</sup>**

| Ordering Part Number (OPN)                                                                                                                                        | Alternative Part Number (APN) | Number of Inputs VDD1 Side | Number of Inputs VDD2 Side | Maximum Data Rate (Mbps) | Isolation Rating | Package Type              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|----------------------------|--------------------------|------------------|---------------------------|
| Revision D Devices <sup>2</sup>                                                                                                                                   |                               |                            |                            |                          |                  |                           |
| Si8440AA-D-IS1                                                                                                                                                    | Si8640AB-B-IS1                | 4                          | 0                          | 1                        | 1 kVrms          | NB SOIC-16 <sup>1</sup>   |
| Si8440BA-D-IS1                                                                                                                                                    | Si8640BB-B-IS1                | 4                          | 0                          | 150                      |                  |                           |
| Si8441AA-D-IS1                                                                                                                                                    | Si8641AB-B-IS1                | 3                          | 1                          | 1                        |                  |                           |
| Si8441BA-D-IS1                                                                                                                                                    | Si8641BB-B-IS1                | 3                          | 1                          | 150                      |                  |                           |
| Si8442AA-D-IS1                                                                                                                                                    | Si8642AB-B-IS1                | 2                          | 2                          | 1                        |                  |                           |
| Si8442BA-D-IS1                                                                                                                                                    | Si8642BB-B-IS1                | 2                          | 2                          | 150                      |                  |                           |
| Si8445BA-D-IS1                                                                                                                                                    | Si8645BB-B-IS1                | 4                          | 0                          | 150                      | 2.5 kVrms        | WB SOIC-16 <sup>1,3</sup> |
| Si8440AB-D-IS                                                                                                                                                     | Si8640AB-B-IS                 | 4                          | 0                          | 1                        |                  |                           |
| Si8440BB-D-IS                                                                                                                                                     | Si8640BB-B-IS                 | 4                          | 0                          | 150                      |                  |                           |
| Si8441AB-D-IS                                                                                                                                                     | Si8641AB-B-IS                 | 3                          | 1                          | 1                        |                  |                           |
| Si8441BB-D-IS                                                                                                                                                     | Si8641BB-B-IS                 | 3                          | 1                          | 150                      |                  |                           |
| Si8442AB-D-IS                                                                                                                                                     | Si8642AB-B-IS                 | 2                          | 2                          | 1                        |                  |                           |
| Si8442BB-D-IS                                                                                                                                                     | Si8642BB-B-IS                 | 2                          | 2                          | 150                      | 2.5 kVrms        | NB SOIC-16 <sup>1</sup>   |
| Si8445BB-D-IS                                                                                                                                                     | Si8645BB-B-IS                 | 4                          | 0                          | 150                      |                  |                           |
| Si8440AB-D-IS1                                                                                                                                                    | Si8640AB-B-IS1                | 4                          | 0                          | 1                        |                  |                           |
| Si8440BB-D-IS1                                                                                                                                                    | Si8640BB-B-IS1                | 4                          | 0                          | 150                      |                  |                           |
| Si8441AB-D-IS1                                                                                                                                                    | Si8641AB-B-IS1                | 3                          | 1                          | 1                        |                  |                           |
| Si8441BB-D-IS1                                                                                                                                                    | Si8641BB-B-IS1                | 3                          | 1                          | 150                      |                  |                           |
| Si8442AB-D-IS1                                                                                                                                                    | Si8642AB-B-IS1                | 2                          | 2                          | 1                        |                  |                           |
| Si8442BB-D-IS1                                                                                                                                                    | Si8642BB-B-IS1                | 2                          | 2                          | 150                      |                  |                           |
| Si8445BB-D-IS1                                                                                                                                                    | Si8645BB-B-IS1                | 4                          | 0                          | 150                      |                  |                           |
| Notes:                                                                                                                                                            |                               |                            |                            |                          |                  |                           |
| 1. All packages are RoHS-compliant with peak reflow temperatures of 260 °C according to the JEDEC industry standard classifications and peak solder temperatures. |                               |                            |                            |                          |                  |                           |
| 2. Revision C and Revision D devices are supported for existing designs.                                                                                          |                               |                            |                            |                          |                  |                           |
| 3. AEC-Q100 qualified.                                                                                                                                            |                               |                            |                            |                          |                  |                           |

Table 15. Ordering Guide for Valid OPNs<sup>1</sup> (Continued)

| Ordering Part Number (OPN)                                                                                                                                                                                                                                                        | Alternative Part Number (APN) | Number of Inputs VDD1 Side | Number of Inputs VDD2 Side | Maximum Data Rate (Mbps) | Isolation Rating | Package Type            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|----------------------------|--------------------------|------------------|-------------------------|
| Revision C Devices <sup>2</sup>                                                                                                                                                                                                                                                   |                               |                            |                            |                          |                  |                         |
| Si8440AA-C-IS1                                                                                                                                                                                                                                                                    | Si8640AB-B-IS1                | 4                          | 0                          | 1                        | 1 kVrms          | NB SOIC-16 <sup>1</sup> |
| Si8440BA-C-IS1                                                                                                                                                                                                                                                                    | Si8640BB-B-IS1                | 4                          | 0                          | 150                      |                  |                         |
| Si8441AA-C-IS1                                                                                                                                                                                                                                                                    | Si8641AB-B-IS1                | 3                          | 1                          | 1                        |                  |                         |
| Si8441BA-C-IS1                                                                                                                                                                                                                                                                    | Si8641BB-B-IS1                | 3                          | 1                          | 150                      |                  |                         |
| Si8442AA-C-IS1                                                                                                                                                                                                                                                                    | Si8642AB-B-IS1                | 2                          | 2                          | 1                        |                  |                         |
| Si8442BA-C-IS1                                                                                                                                                                                                                                                                    | Si8642BB-B-IS1                | 2                          | 2                          | 150                      |                  |                         |
| Si8445BA-C-IS1                                                                                                                                                                                                                                                                    | Si8645BB-B-IS1                | 4                          | 0                          | 150                      |                  |                         |
| Si8440AB-C-IS                                                                                                                                                                                                                                                                     | Si8640AB-B-IS                 | 4                          | 0                          | 1                        | 2.5 kVrms        | WB SOIC-16 <sup>1</sup> |
| Si8440BB-C-IS                                                                                                                                                                                                                                                                     | Si8640BB-B-IS                 | 4                          | 0                          | 150                      |                  |                         |
| Si8441AB-C-IS                                                                                                                                                                                                                                                                     | Si8641AB-B-IS                 | 3                          | 1                          | 1                        |                  |                         |
| Si8441BB-C-IS                                                                                                                                                                                                                                                                     | Si8641BB-B-IS                 | 3                          | 1                          | 150                      |                  |                         |
| Si8442AB-C-IS                                                                                                                                                                                                                                                                     | Si8642AB-B-IS                 | 2                          | 2                          | 1                        |                  |                         |
| Si8442BB-C-IS                                                                                                                                                                                                                                                                     | Si8642BB-B-IS                 | 2                          | 2                          | 150                      |                  |                         |
| Si8445BB-C-IS                                                                                                                                                                                                                                                                     | Si8645BB-B-IS                 | 4                          | 0                          | 150                      |                  |                         |
| Si8440AB-C-IS1                                                                                                                                                                                                                                                                    | Si8640AB-B-IS1                | 4                          | 0                          | 1                        | 2.5 kVrms        | NB SOIC-16 <sup>1</sup> |
| Si8440BB-C-IS1                                                                                                                                                                                                                                                                    | Si8640BB-B-IS1                | 4                          | 0                          | 150                      |                  |                         |
| Si8441AB-C-IS1                                                                                                                                                                                                                                                                    | Si8641AB-B-IS1                | 3                          | 1                          | 1                        |                  |                         |
| Si8441BB-C-IS1                                                                                                                                                                                                                                                                    | Si8641BB-B-IS1                | 3                          | 1                          | 150                      |                  |                         |
| Si8442AB-C-IS1                                                                                                                                                                                                                                                                    | Si8642AB-B-IS1                | 2                          | 2                          | 1                        |                  |                         |
| Si8442BB-C-IS1                                                                                                                                                                                                                                                                    | Si8642BB-B-IS1                | 2                          | 2                          | 150                      |                  |                         |
| Si8445BB-C-IS1                                                                                                                                                                                                                                                                    | Si8645BB-B-IS1                | 4                          | 0                          | 150                      |                  |                         |
| Notes:<br>1. All packages are RoHS-compliant with peak reflow temperatures of 260 °C according to the JEDEC industry standard classifications and peak solder temperatures.<br>2. Revision C and Revision D devices are supported for existing designs.<br>3. AEC-Q100 qualified. |                               |                            |                            |                          |                  |                         |

[illegible]

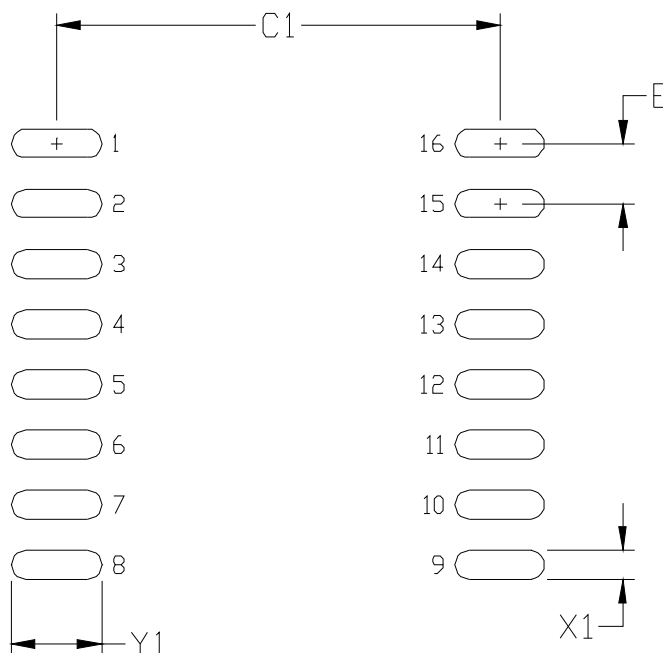
### Figure 16. 16-Pin Wide Body SOIC

### Table 16. Package Diagram Dimensions

| Symbol | Millimeters |      |
|--------|-------------|------|
|        | Min         | Max  |
| A      | —           | 2.65 |
| A1     | 0.1         | 0.3  |
| D      | 10.3 BSC    |      |
| E      | 10.3 BSC    |      |
| E1     | 7.5 BSC     |      |
| b      | 0.31        | 0.51 |
| c      | 0.20        | 0.33 |
| e      | 1.27 BSC    |      |
| h      | 0.25        | 0.75 |
| L      | 0.4         | 1.27 |
| θ      | 0°          | 7°   |

## 7. Land Pattern: 16-Pin Wide-Body SOIC

Figure 17 illustrates the recommended land pattern details for the Si844x in a 16-pin wide-body SOIC. Table 17 lists the values for the dimensions shown in the illustration.



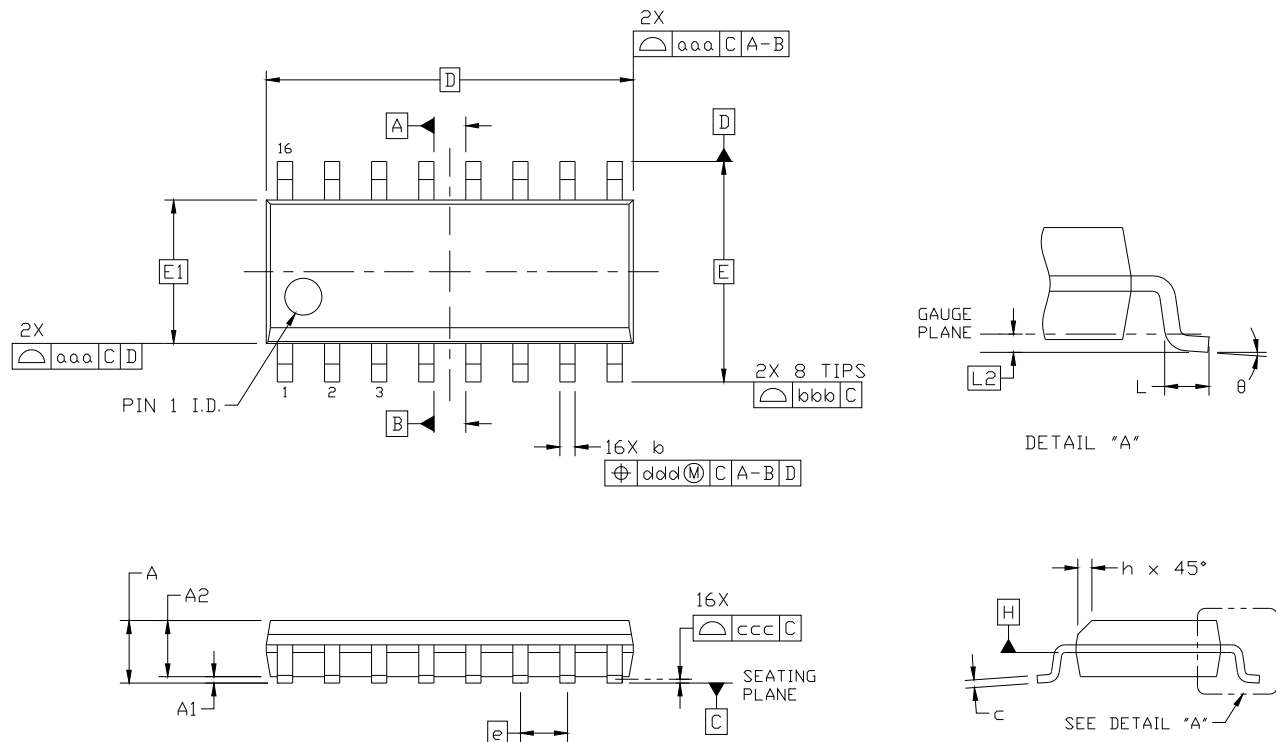
**Figure 17. 16-Pin SOIC Land Pattern**

**Table 17. 16-Pin Wide Body SOIC Land Pattern Dimensions**

| Dimension                                                                                                                                                                                                                                                                                                                        | Feature            | (mm) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------|
| C1                                                                                                                                                                                                                                                                                                                               | Pad Column Spacing | 9.40 |
| E                                                                                                                                                                                                                                                                                                                                | Pad Row Pitch      | 1.27 |
| X1                                                                                                                                                                                                                                                                                                                               | Pad Width          | 0.60 |
| Y1                                                                                                                                                                                                                                                                                                                               | Pad Length         | 1.90 |
| <b>Notes:</b> <ol style="list-style-type: none"> <li>1. This Land Pattern Design is based on IPC-7351 pattern SOIC127P1032X265-16AN for Density Level B (Median Land Protrusion).</li> <li>2. All feature sizes shown are at Maximum Material Condition (MMC) and a card fabrication tolerance of 0.05 mm is assumed.</li> </ol> |                    |      |

## 8. Package Outline: 16-Pin Narrow Body SOIC

Figure 18 illustrates the package details for the Si844x in a 16-pin narrow-body SOIC (SO-16). Table 18 lists the values for the dimensions shown in the illustration.



**Figure 18. 16-pin Small Outline Integrated Circuit (SOIC) Package**

**Table 18. Package Diagram Dimensions**

| Dimension | Min      | Max  |
|-----------|----------|------|
| A         | —        | 1.75 |
| A1        | 0.10     | 0.25 |
| A2        | 1.25     | —    |
| b         | 0.31     | 0.51 |
| c         | 0.17     | 0.25 |
| D         | 9.90 BSC |      |
| E         | 6.00 BSC |      |
| E1        | 3.90 BSC |      |
| e         | 1.27 BSC |      |
| L         | 0.40     | 1.27 |
| L2        | 0.25 BSC |      |

Table 18. Package Diagram Dimensions (Continued)

| Dimension                                                                                                                                                                                                                                                                                                                                                                                                      | Min  | Max  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|
| h                                                                                                                                                                                                                                                                                                                                                                                                              | 0.25 | 0.50 |
| θ                                                                                                                                                                                                                                                                                                                                                                                                              | 0°   | 8°   |
| aaa                                                                                                                                                                                                                                                                                                                                                                                                            | 0.10 |      |
| bbb                                                                                                                                                                                                                                                                                                                                                                                                            | 0.20 |      |
| ccc                                                                                                                                                                                                                                                                                                                                                                                                            | 0.10 |      |
| ddd                                                                                                                                                                                                                                                                                                                                                                                                            | 0.25 |      |
| <b>Notes:</b> <ol style="list-style-type: none"><li>1. All dimensions shown are in millimeters (mm) unless otherwise noted.</li><li>2. Dimensioning and Tolerancing per ANSI Y14.5M-1994.</li><li>3. This drawing conforms to the JEDEC Solid State Outline MS-012, Variation AC.</li><li>4. Recommended card reflow profile is per the JEDEC/IPC J-STD-020 specification for Small Body Components.</li></ol> |      |      |

9. Land Pattern: 16-Pin Narrow Body SOIC

Figure 19 illustrates the recommended land pattern details for the Si844x in a 16-pin narrow-body SOIC. Table 19 lists the values for the dimensions shown in the illustration.



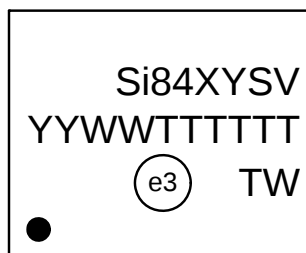
Figure 19. 16-Pin Narrow Body SOIC PCB Land Pattern

Table 19. 16-Pin Narrow Body SOIC Land Pattern Dimensions

| Dimension                                                                                                                                                                                                                                                                 | Feature            | (mm) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------|
| C1                                                                                                                                                                                                                                                                        | Pad Column Spacing | 5.40 |
| E                                                                                                                                                                                                                                                                         | Pad Row Pitch      | 1.27 |
| X1                                                                                                                                                                                                                                                                        | Pad Width          | 0.60 |
| Y1                                                                                                                                                                                                                                                                        | Pad Length         | 1.55 |
| <b>Notes:</b><br>1. This Land Pattern Design is based on IPC-7351 pattern SOIC127P600X165-16N for Density Level B (Median Land Protrusion).<br>2. All feature sizes shown are at Maximum Material Condition (MMC) and a card fabrication tolerance of 0.05 mm is assumed. |                    |      |

## 10. Top Marking: 16-Pin Wide Body SOIC

### 10.1. 16-Pin Wide Body SOIC Top Marking

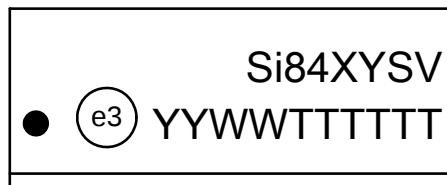


### 10.2. Top Marking Explanation

|                        |                                                                                        |                                                                                                                                                                                                                                             |
|------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Line 1 Marking:</b> | Base Part Number<br>Ordering Options<br><br>(See Ordering Guide for more information). | Si84 = Isolator product series<br>XY = Channel Configuration<br>X = # of data channels (4, 3, 2, 1)<br>Y = # of reverse channels (2, 1, 0)*<br>S = Speed Grade<br>A = 1 Mbps; B = 150 Mbps<br>V = Insulation rating<br>A = 1 kV; B = 2.5 kV |
|                        | YY = Year<br>WW = Workweek                                                             | Assigned by Assembly House. Corresponds to the year and workweek of the mold date.                                                                                                                                                          |
| <b>Line 2 Marking:</b> | TTTTTT = Mfg Code                                                                      | Manufacturing Code from Assembly House                                                                                                                                                                                                      |
|                        | Circle = 1.5 mm Diameter<br>(Center-Justified)                                         | "e3" Pb-Free Symbol                                                                                                                                                                                                                         |
| <b>Line 3 Marking:</b> | Country of Origin ISO Code<br>Abbreviation                                             | TW = Taiwan                                                                                                                                                                                                                                 |
|                        | <b>*Note:</b> Si8445 has 0 reverse channels.                                           |                                                                                                                                                                                                                                             |

## 11. Top Marking: 16-Pin Narrow Body SOIC

### 11.1. 16-Pin Narrow Body SOIC Top Marking



### 11.2. Top Marking Explanation

|                                              |                                                                                        |                                                                                                                                                                                                                                             |
|----------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Line 1 Marking:</b>                       | Base Part Number<br>Ordering Options<br><br>(See Ordering Guide for more information). | Si84 = Isolator product series<br>XY = Channel Configuration<br>X = # of data channels (4, 3, 2, 1)<br>Y = # of reverse channels (2, 1, 0)*<br>S = Speed Grade<br>A = 1 Mbps; B = 150 Mbps<br>V = Insulation rating<br>A = 1 kV; B = 2.5 kV |
| <b>Line 2 Marking:</b>                       | Circle = 1.2 mm Diameter                                                               | "e3" Pb-Free Symbol                                                                                                                                                                                                                         |
|                                              | YY = Year<br>WW = Work Week                                                            | Assigned by the Assembly House. Corresponds to the year and work week of the mold date.                                                                                                                                                     |
|                                              | TTTTTT = Mfg code                                                                      | Manufacturing Code from Assembly Purchase Order form.                                                                                                                                                                                       |
|                                              | Circle = 1.2 mm diameter                                                               | "e3" Pb-Free Symbol.                                                                                                                                                                                                                        |
| <b>*Note:</b> Si8445 has 0 reverse channels. |                                                                                        |                                                                                                                                                                                                                                             |

## DOCUMENT CHANGE LIST

### Revision 0.62 to Revision 0.63

- Rev 0.63 is the first revision of this document that applies to the new series of ultra low power isolators featuring pinout and functional compatibility with previous isolator products.
- Updated "1. Electrical Specifications".
- Updated "5. Ordering Guide".
- Added "10. Top Marking: 16-Pin Wide Body SOIC".

### Revision 0.63 to Revision 0.64

- Updated all specs to reflect latest silicon.

### Revision 0.64 to Revision 0.65

- Updated all specs to reflect latest silicon.
- Added "3. Errata and Design Migration Guidelines" on page 24.
- Added "11. Top Marking: 16-Pin Narrow Body SOIC" on page 34.

### Revision 0.65 to Revision 1.0

- Updated document to reflect availability of Revision D silicon.
- Updated Tables 3,4, and 5.
  - Updated all supply currents and channel-channel skew.
- Updated Table 2.
  - Updated absolute maximum supply voltage.
- Updated Table 7.
  - Updated clearance and creepage dimensions.
- Updated Table 12.
  - Updated Note 7.
- Updated Table 13.
  - Updated Note 3.
- Updated "3. Errata and Design Migration Guidelines" on page 24.
- Updated "5. Ordering Guide" on page 26.

### Revision 1.0 to Revision 1.1

- Updated Tables 3, 4, and 5.
  - Updated notes in both tables to reflect output impedance of 85  $\Omega$ .
  - Updated rise and fall time specifications.
  - Updated CMTI value.

### Revision 1.1 to Revision 1.2

- Updated document throughout to include MSL improvements to MSL2A.
- Updated "5. Ordering Guide" on page 26.
  - Updated Note 1 in ordering guide table to reflect improvement and compliance to MSL2A moisture sensitivity level.

### Revision 1.2 to Revision 1.3

- Updated "Features" on page 1.
- Moved Tables 1 and 2 to page 3.
- Updated Tables 6, 7, 8, and 9.
- Updated Table 12 footnotes.
- Added Figure 15, "Si84xx Time-Dependent Dielectric Breakdown," on page 23.

### Revision 1.3 to Revision 1.4

- Updated "2.4.1. Supply Bypass" on page 21.
- Added Figure 8, "Recommended Bypass Components for the Si84xx Digital Isolator Family," on page 21.
- Updated "3.2. Power Supply Bypass Capacitors (Revision C and Revision D)" on page 24.

### Revision 1.4 to Revision 1.5

- Updated "5. Ordering Guide" on page 26 to include MSL2A.

### Revision 1.5 to Revision 1.6

- Updated "5. Ordering Guide" on page 26 to include new title note and "Alternative Part Number (APN)" column.

### Revision 1.6 to Revision 1.7

- Deleted references to MSL ratings throughout document to eliminate redundancy and maintain compliance with corporate data sheet format requirements. The MSL ratings are specified in the Qualification Report for the product.



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